The Journal of Laryngology and Otology
December 1988. Vol. **102.** pp. 1079–1085

The evolution of rhinoplasty

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It is believed that plastic surgery was performed in India and Egypt as long as 3,000 years ago. Social pressures for the replacement of the nose seem to have been the initiating factor. Amputation of the nose and sometimes of the ears was a common punishment for certain crimes, particularly for unfaithful wives (McDowell, 1969*a*). Similar punishment was meted out to criminals and sexual offenders. It was common practice in prehistoric times for children born with congenital defects of face or body to be killed at birth or left to die. The loss of the nose and the resulting disfigurement resulted in a much diminished social acceptability. And, in the case of amputation for crime or misbehaviour, total rejection by society. In an historical review of total nasal reconstruction, Nichter and his co-authors (1983) noted that the first description of multilation of the nose came from India with the deliberate amputation of Lady Surpunakha's nose in 1500 B.C. by Prince Lakshamana. The mighty King Ravana angered by this, gave his physicians the task of reconsructing the lady's nose and thus commenced the first documented account of nasal reconstructive surgery in India.

The nose should also be seen as an organ which lends itself to adornment and rings and clips are fastened to it even at the present time. In fact, the vogue seems to be undergoing a revival in popularity.

Nasal disfigurement was also caused by the ravages of endemic diseases like leprosy, smallpox, noma, lupus and especially syphilis, which during the height of the syphilis epidemic of the 17th Century in Europe, reeked such havoc. This was not entirely unexpected perhaps when one considers that an estimated 15,000 prostitutes, outnumbering the men by 2 to 1, travelled with the troops of Wallenstein in the siege of Nünberg in 1632.

In India and other parts of the world, people mutilated by disease and having the classical saddle nose deformity were considered outcasts, and even at the present time though new drugs can "cure" the disease process, the resulting saddle nose persists. This deformity remains an eloquent hallmark of the disease identifying the patient and preventing the reacceptance of the "cured" patient into the community. The simple insertion of obturators as an intranasal epithesis to build up the nasal bridge may be sufficient to enable these victims of disease to be accepted back into their village and social structure. (Fig. 1.)

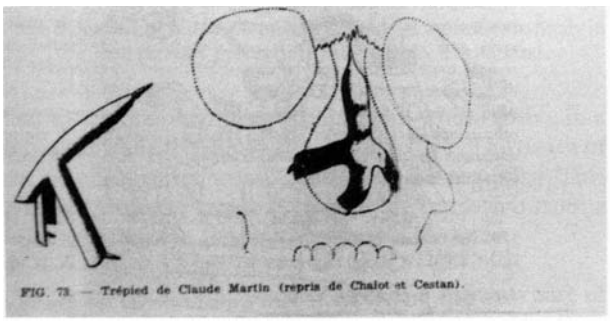


FIG. 1
Martin's tripod nasal splint for intranasal support in cases of saddle nose. Cit. By Willemot.

Leonardo da Vinci was the first to measure out the face and specify principles of beauty based on exact measurements. (Figs. 2, 3 and 4.)

If we consider the European head or skull in profile, we observe that when the lines have a tendency to one direction the appearances are those of the brute. If in the opposite direction, it presents the picture of the classical appearance of the Greek head. The latter was therefore designed to amplify or accentuate those proportions which are characteristic of the human countenance when compared with the lower animals. Charles Bell, (1806), the renowned anatomist, in his essays on "The Anatomy of Expression in Painting" published in 1806, distinguished between expression in painting and sculpture. It is the latter which the plastic surgeon must seek to emulate.

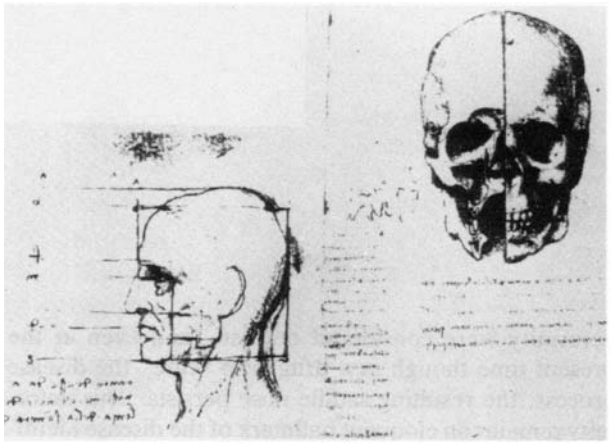
The painter records faithfully, the textures of the skin, the various colours, the tortuous veins and by virtue of this adds dignity to the head. The sculptor unable to reproduce these aspects confines himself to highlighting those features which are perceived as indicating a higher form, the antic or what we call 'Roman' head.

If one compares the skull with the classical sculptured Greek or Roman head, one observed a great breadth in the forehead of the antic more than is natural to the skull. The orbits are large and the angles formed by the cheekbones of the common skull would be cut off were we to compare the oval to the antic face of the naked bones. The angles of the jaw would likewise be cut off.

The first recorded treatment of the injured nose is to be found in the Egyptian, Smith papyrus estimated to have been written about 3,000 B.C. Hieroglyphics illustrate the treatment of broken noses by nasal packing and external adhesive plaster. (Willemot 1970, 1981) (Fig. 5).

The first really detailed description, however, was by Sushruta Samhitá about 600 B.C. His description of the nasal reconstruction technique was not the Indian forehead method which is commonly attributed to him but

First part Semon Lecture, University of London, delivered at the Royal Society of Medicine on 5 November 1987.



A B

FIG. 13. — Leonardo da Vinci a étudié les proportions de la tête (A) et dessiné les sinus (B).

FIG. 2
Leonardo da Vincini's studies on facial proportions.

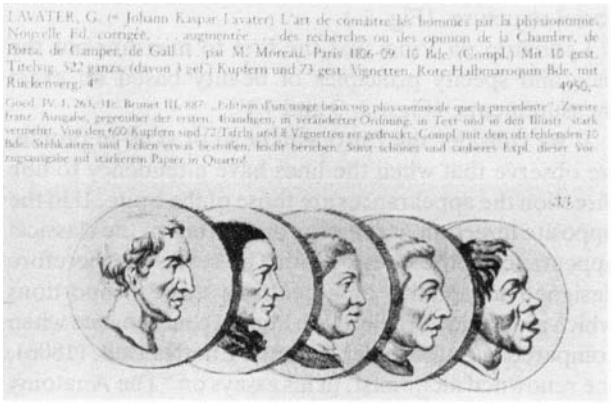


FIG. 3
Lavater: La physionomie des hommes.

one based on the use of a cheek flap. This represents the first description of the use of a pedicle flap.

The Roman physician Celsus was the first European to record techniques for closing defects of the nose, lips and ears by using adjacent tissues (Marmelzat, 1982).

These developments and the documented reports almost certainly provided the impetus for similar work in other countries. Thus when, in the 15th Century, the Branca brothers became celebrated for their surgical abilities in the art of total nasal reconstruction (Fig. 6), it is not surprising that their techniques duplicated those described by Sushruta Samhita some 2,000 years earlier. In 1400i A.D., Antonius Branca from Sicily, influenced by his father's work developed a new technique for total nasal reconstruction using a flap of tissue taken from the arm. This method (Fig. 7) was practiced and perpetuated mainly through the members of the Vineo family in Calabria who specialised in reconstructing noses (McDowel, 1970), lips and ears (Tripodi, 1968). It is from this family that Gaspare Tagliacozzi of Bolognia (1545–1599) (Fig. 8) learned and popularized the procedure that came to be known as the Italian method (Cosman, 1978). This involved a lengthy and tedious operation carried out as a series of six separate steps (Figs. 9, 10 and 11). So great was the renown of Tagliacozzi that shortly after his death the magistrates of Bolognia honoured his memory with a statue which represented him holding a nose in his hands. Later after his death, theologians attacked him for impiously interfering with the handiwork of God. His body was thus exhumed from the consecrated ground of the church of San Giovanni Battista (Fig. 12); his work later became neglected. It was largely forgotten except for the comments emanating from Paolo Zacchias (Willemot, 1981), physician to Pope Innocent Xth who, in 1612, summarized the effect that Tagliacozzi had during his lifetime. If a malfactor was condemned to loose his nose it was legal to have it restored by the operation of Tagliacozzi, because the operation could be considered a punishment on account of the time required to perform and the pain endured! This is a good example of the deviousness of theological argument. The sympathetic theory was popular in Tagliacozzi's time. It was believed

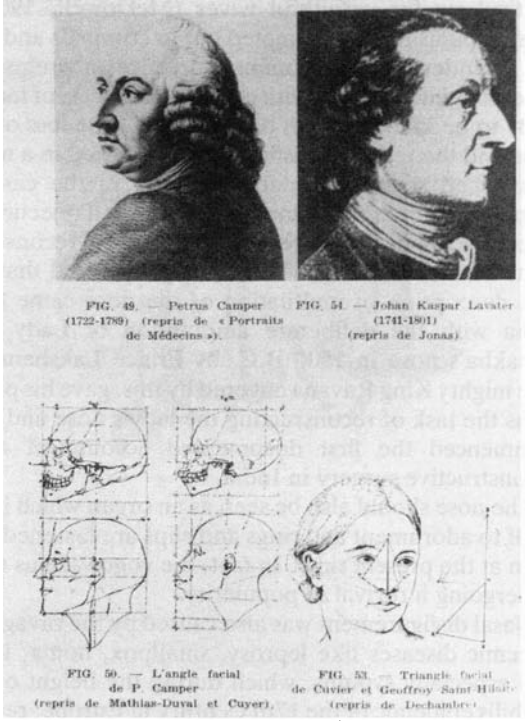


FIG. 49. — Petrus Camper (1722-1789) (repris de « Portraits de Médecins »).

FIG. 54. — Johan Kaspar Lavater (1741-1801) (repris de Jonas).

FIG. 50. — L'angle facial de P. Camper (repris de Mathias-Duval et Cuyer).

FIG. 53. — Triangle facial de Cuvier et Geoffroy Saint-Hilaire (repris de Dechambre).

FIG. 4
Camper and Lavanter in their essays on facial contours and expressions. From Willemot.

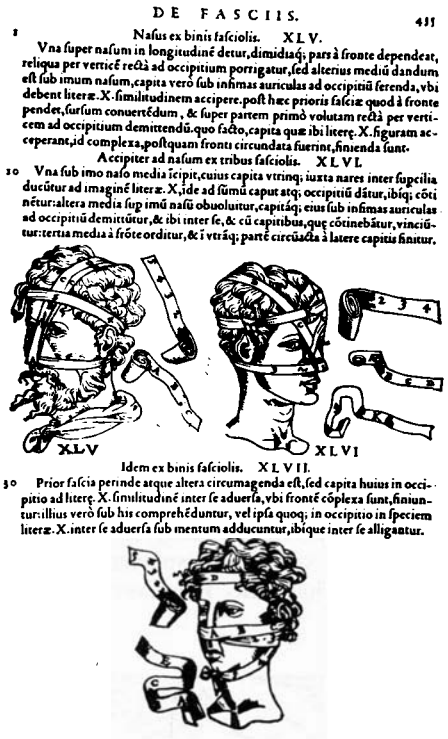
HISTOIRE DE L'ORL

FIG. 5. — Les mexicains se faisaient perforer la cloison pour y pendre un anneau ou y glisser un bâtonnet de jade. Ci-dessus, cérémonie rituelle de la perforation sur Huit-cerfs Griffe d'Ocelot, chef Mixtèque (Tilantonjo, Oaxaca, 1011-1063) (Codex Nuttal, Mexico). Le masque est perforé avant la cloison.

FIG. 5
Ritual rhinoplasty by pre-Columbian Mexican priests.

FIG. 29. — Caricature du dix-septième siècle (repris de Maltz).

FIG. 6
Caricature sketch of rhinoplasty in medieval times.


DE FASCIIS. 431

Naſus ex binis faſciolis. XLV.

Vna ſuper naſum in longitudinẽ detur, dimidiaq; pars à fronte dependeat, reliqua per verticẽ rectà ad occipitium porrigatur, ſed alterius mediũ dandum eſt ſub imum naſum, capita verò ſub infimas auriculas ad occipitiũ ferenda, vbi debent literæ X. ſimilitudinem accipere. poſt hæc prioris faſciæ quod à fronte pendet, ſurſum conuertẽdum, & ſuper partem primò volutam rectà per verticem ad occipitium demittendũ. quo facto, capita quæ ibi literę X. figuram acceperant, id complexa, poſtquam fronti circundata fuerint, finienda ſunt.

Accipiter ad naſum ex tribus faſciolis. XLVI.

Vna ſub imo naſo media ſcipit, cuius capita vtrinq; iuxta nares inter ſupcilia ducũtur ad imaginẽ literæ. X, ide ad ſũmũ caput atq; occipitiũ dãtur, ibiq; cõtinẽtur: altera media ſup imũ naſũ obuoluitur, capitáq; eius ſub infimas auriculas ad occipitiũ demittũtur, & ibi inter ſe, & cũ capitibus, quę cõtinebãtur, vinciũtur: tertia media à frõte orditur, & ĩ vtrãq; partẽ circũdata à latere capitis finitur.

XLV XLVI

Idem ex binis faſciolis. XLVII.

Prior faſcia perinde atque altera circumagenda eſt, ſed capita huius in occipitio ad literę X. ſimilitudinẽ inter ſe aduerſa, vbi frontẽ cõplexa ſunt, finiuntur: illius verò ſub his comprehẽduntur, vel ipſa quoq; in occipitio in ſpeciem literæ X. inter ſe aduerſa ſub mentum adducuntur, ibique inter ſe alligantur.

FIG. 11. — « De fasciis » de Galien, commenté et illustré par Guido Guidi (Vidus Vidius).

FIG. 7
From Branca. The Vianeo family practiced rhinoplasties in Sicily in the 15th century preceeding the work by Tagliacozzi.

that tissue removed from an individul would thrive in a recipient while the donor continued to live. The death of the donor however would cause the graft to perish. This together with the fact that grafts were borrowed from a servant prompted the following satyrical lines:

> So learned Tagliacozzius from the browny part of portresses bum etc.

Tagliacozzi's work was sufficiently successful to remain in popular use until World War I. It was published in 1597, two years before his death at the age of fifty-four. About the same time Pfalzpoint was achieving prominence in Germany (Hauben, 1983; Mazzola and Marcus, 1983).

Heterogeneic free grafts were unsuccessfully tried as well as alloplastic materials. Tycho Brahe, the astronomer, wore a golden nose after he lost his own in a duel (perhaps a mute comment on his perception on the state of the art of nasal reconstruction at that time) (Lee, 1972).

In 1828, Lisfranc presented his technique of nasal reconstruction using a forearm flap. In his paper presented at the French Academy, he explained that he used a piece of cardboard to take the measurements of the new nose (Lisfranc, 1982). He also knew exactly how to cut the forehead flap, taking care to incorporate some nourishing vessels for its survival. He was well aware of

FIG. 20. — Tagliacozzi tenant un nez en main. Statue en bois réalisée par Silvestro Giannotti en 1733 et ayant orné l'amphithéâtre d'anatomie de l'Archigymnase de Bologne. Elle fut détruite lors des bombardements en 1944 mais restaurée.

FIG. 8
Statue of Tagilacozzi with the nose in his hand.

A

FIG. 9
Woodcuts from his famous book explaining his technique of reconstructive rhinoplasty.

B

FIG. 10
Woodcuts from his famous book explaining his technique of reconstructive rhinoplasty.

the fact that in nasal reconstruction at least one week or more was required before the nutritional pedicle could be separated (Mros and Urzendowsky, 1967). Velpaud (1795–1867) stated that the operation of nasal reconstruction, the object of which was to repair mutilations, constituted, when successful, one of the greatest triumphs in surgery. Later on, Roux and Dupuytren came to occupy the sublime heights of the plastic surgery mountain. The actual idea of folding a forehead flap for the restoration of the lower part of the nose belongs to August Labat of Paris who suggested this method in 1834 (Mazzola and Marcus, 1983). In 1835 Delpeche, from Montpellier, employed a folded skin flap but used it for the reconstruction of eyelids and lips (Figs. 13, 14 and 15) (Delpech, 1828; Serre, 1842; Gibson, 1956–7; Fomon, 1958; McDowell, 1969*b*; McDowell, 1969*c*; Galanti, *et al.*, 1970; Brunner, 1979; Hauben, 1983*c*; Mazzola and Marcus, 1983; Bennett, 1983, 1984).

Carl Ferdinand von Graefe was the foremost German surgeon in the 19th Century and lived from 1787–1840. He entered medical school in Dresden. In 1810, at the age of 23, he was promoted to Professor of Surgery and Medicine at the University of Berlin. (Rogers, 1970; Willemot, 1970, 1981). During the war against Napoleon he was called upon to perform in excess of 50 amputations a day, and moved by such mutilating procedures he devoted more and more of his time to the study of plastic surgical techniques (Rogers, 1970). He was a noted linguist speaking seven languages, and travelled widely visiting both France and England where he was well received. He commenced transplantation in Germany when everybody thought it was totally impossible. He introduced the Indian and Tagliacozzi's method of nasal reconstruction in Germany in 1817, and was the first to introduce the term rhinoplasty into the literature. In 1836, the term Plastic Surgery was introduced by Zeis in his "Handbuch der Plastischen Chirurgie" (Mros and Urzendowsky, 1967).

Johann Friedrich Diffenbach (1792–1847) was a General Practitioner in Berlin until, as a result of his contribution to plastic surgical techniques, he was promoted and given the title of Professor in 1832. Among his many contributions to plastic surgery should be mentioned his work on lip and cheek reconstruction. He went on to earn the title "Father of Plastic Surgery". He described the reconstruction of a mutilated nose from the remnants by pulling the pieces back together. He used very few ligatures but more pressure and cooling to stop the bleeding. He was the first to postulate that the plastic surgeon should behave like a sculptor. His operative record is quite astounding and he is reported to have operated on 120 patients with torticollis, more than 1,000 harelips and over 200 nasal restorations. In an age when antibiotics were unknown his figure of 5 per cent mortality from infection speaks eloquently of his superb surgical technique. He also used ether as an anaesthetic (Mros and Urzendowsky, 1967).

Kapp was credited for being he first to use cocaine topically in nasal surgery, in 1884, and Roe used it effectively, in 1887, which revolutionized the concept of nasal surgery with control of nasal bleeding.

A copper etching by J. Wales, made in 1794, (Brunner, 1979), shows the procedure used by an Indian surgeon serving with the British Forces in reconstructing the nose of a shepherd who had been taken prisoner by Sultan Shabib Tibu who had ordered the cutting off of his nose and one hand with a view to intimidating the British troops. How far he succeded in this regard is not recorded.

In 1816, it was Carpue who introduced the operation of rhinoplasty to England (Carpue, 1969; Freshwater, 1977), Carpue's work, however, was not developed and British surgery missed the opportunity of advancing the work which he started. A study of the bibliography shows that British surgeons displayed little interest in plastic surgery at that time. However, when European

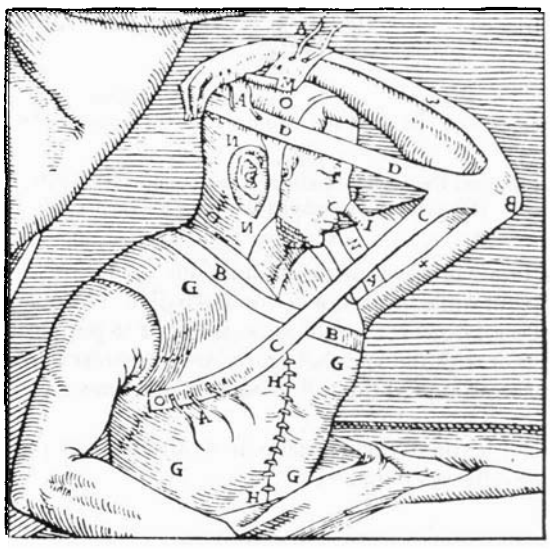


FIG. 11
Woodcuts from his famous book explaining his technique of reconstructive rhinoplasty.

FIG. 21. — « De curtorum chirurgia per insitionem » (1597) : page de garde et planches IV (A), V (B) et VIII (C).

FIG. 12
His tombstone.

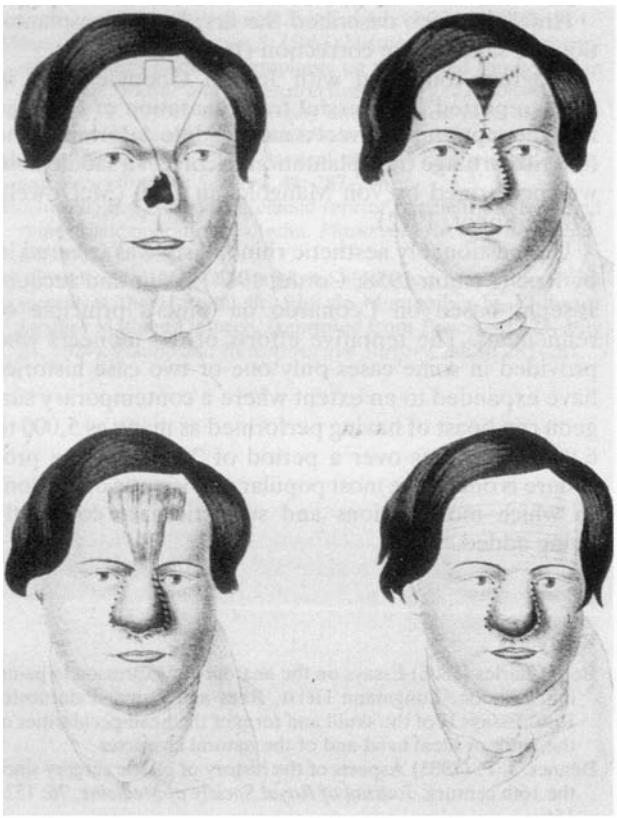


FIG. 13
French method of rhinoplasty.

modifications and improvements in rhinoplasty techniques had been passed back to India, Brett was able to quote Graefe, Dieffenbach and Liston.

Liston's first rhinoplasty employing the forehead Indian rhinoplasty technique (Fig. 16) was performed in 1827 (Hauben, 1927), but it was not until 1837 that Warren performed the operation in North America.

In 1875, William Ash, published his report on the treatment of broken noses using special forceps and external fixation. Ollier attempted to transplant skin and bone with the forehead flap incorporating these elements in the technique (Fig. 17). James Hardy described the transplantation of bones and the correction of the saddle nose. Koenig, in 1886, used bone for the forehead in the treatment of saddle nose and composite grafts. Lossen (1884) treated septal deviations and deviated nasal bones with an apparatus which applied external pressure to the nose. This form of treatment was mistakenly attributed to Jacques Joseph. In the interest of historical accuracy, I must contest this claim. Despite Joseph's many admirable contributions to the field of rhinoplasty and other aspects of pastic and reconstructive surgery which should not and cannot be ignored, the age of corrective aesthetic rhinoplasty actually began in 1887 when John Orlando Roe (1848–1915), an Otolaryngologist from Rochester, New York,

FIG. 1 FIG. 2

Fig. 1.—Delpech's first case of rhinoplasty; a boy aged 12 whom he found begging in the streets. The cleft was congenital and epiphora and conjunctivitis were marked.

Fig. 2.—A central forehead flap of the Indian type and without lining was used for repair.

FIG. 14
From Delpech's publication on reconsructing a nose by a forehead flap cited by Th. Gibson. Brit. J. Plast. Surgery 2, 1956/57, page 4.

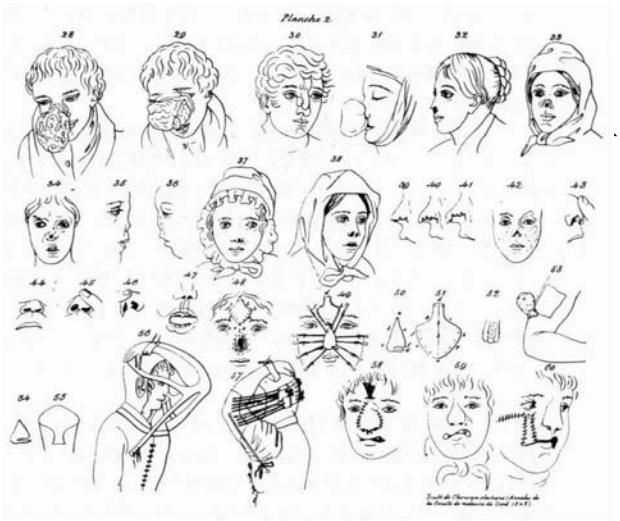


FIG. 65. — Planche de « Traité de chirurgie plastique » d'Ammon et Baumgarten (1843).

FIG. 15
Demonstration of surgical methods of facial and nasal reconstruction by Ammon and Baumgarten.

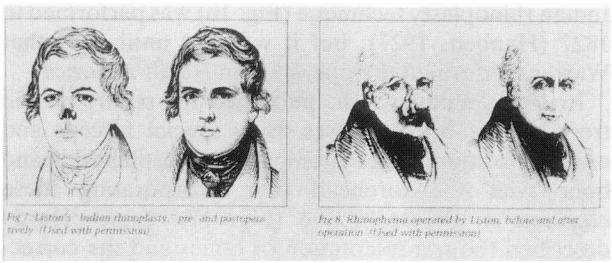


FIG. 16
Liston's rhinoplasty.

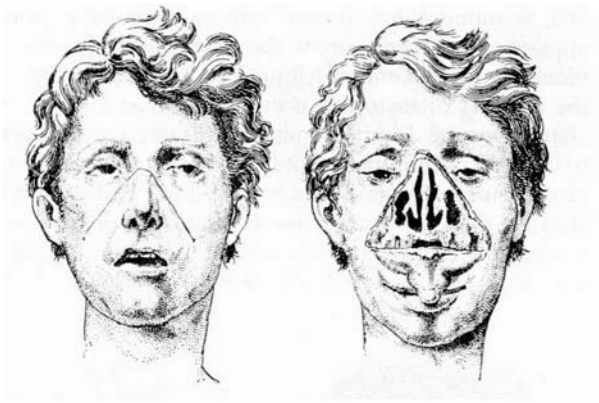


FIG. 87. — Technique d'Ollier pour opération des polypes nasopharyngiens (repris de Spreafico y Garcia).

FIG. 17
Open rhinoplasty to expose the paranasal contents for polyp removal. After Ollier.

described an essentially intranasal operation confined to the tip of a so-called pug nose (McDowell, *et al.*, 1952; Cottle, 1964).

In 1887, Roe published a paper outlining the advantages of approaching deformities intranasally rather than extranasally, thus avoiding unpleasant external scarring. Roe's publication, in 1891, of the correction of angular deformities of the nose by subcutaneous operation was another 'first' in which he described corrective rhinoplasty of the entire nasal profile whereby the nose was reduced in size and protrusion by the intranasal removal of the prominent bony hump (Rogers, 1986). Roe's paper of 1891 was the first to incorporate 'before and after' photographs of three patients with successful intranasal operations.

Roe's exceptional aesthetic sense is revealed in a statement he made in 1905: "In the correction of all facial defects the surgeon must not only be an artist but also more or less of a sculptor with perception of symmetry as related to the different features", echoing the principles as outlined by Bell in his Essays. He was also the first to appreciate the importance of the psychological aspects of plastic surgery which he so cogently expressed in a paper, in 1905, in which he states:

> "The effects upon the mind of such persons with physical defects is readily seen, reflected in the mental attitude and leads after time to a permanent distortion of the countenance. It would be reasonable therefore for any physician who considers the subject to postulate that many potentially brilliant lives, would be noble personalities, and much latent talent will have been lost to society by reason of embarrassment and mortification arising from the conscious or, in some cases, unconscious influence of some physical infirmity, deformity or unsightly blemish".

Reading this one instinctively recalls that verse form "Gray's Elegy written in a Country Churchyard" which embodies a similar thought:

> "Some mute inglorious Milton, here may rest
> Some Cromwell guiltless of his country's blood"

It is interesting to note that Joseph made no mention of Roe's articles even though all the medical reports were published in the Index Medicus. Perhaps it might have hurt his ego since he also did not mention Weir and his first attempts at corrective rhinoplasties with semilunar excisions of skin on the ala to reduce the width of the nostrils (Natvig, 1971). However, it cannot be denied that Joseph was the first to develop a general concept of facial corrective and reconstructive procedures, and he should be called the true "Father of Aesthetic and Reconstructive Facial Surgery." (Joseph 1971; Hauben, 1983*b*; Milstein, 1984, 1986)

The first nasal infracture was described by Weir of New York, in 1892 (Weir, 1970). He introduced a platinum posthesis and celluloid obturators to replace deficient cartilage, and was the first to excise a wedge-shaped piece of cartilage and mucosa from the caudal septum to correct the hanging nasal tip.

Israel, in 1896, described the first bony transplantation for saddle nose correction (Israel, 1970).

Progress continued with Joseph Goodale who, in 1901, reported a successful transplantation of cartilage fom the septum to correct a nasal saddle deformity. The first rib cartilage transplantation to correct a saddle nose was performed by von Mangold, in 1900 (McDowell, 1970*b*; Sokol, 1972).

Unquestionably aesthetic rhinoplasty was ushered in by Roe (Fomon 1958; Cottle, 1964), Weir and Jacques Joseph, based on Leonardo da Vinci's principle of refinement. The tentative efforts of the pioneers who provided in some cases only one or two case histories have expanded to an extent where a contemporary surgeon can boast of having performed as many as 5,000 to 6,000 operations over a period of 25 years. The procedure is one of the most popular of cosmetic operations to which modifications and subtleties are constantly being added.

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